

Studying the Mysteries of the Universe

"Cosmology is one of the most exciting disciplines in all of physical science. It is concerned not so much with individual stars or galaxies in their own right, but rather with the properties of the Universe as a whole: its origin, evolution, and eventual fate."

Cosmologists work to understand how the Universe came into being, why it looks as it does now, and what the future holds. They make astronomical observations that probe billions of years into the past, to the edge of the knowable Universe. They seek the basis of scientific understanding, using the tools of modern physics, and fashion theories that provide unified and testable models of the evolution of the Universe from its creation to the present, and into the future." (University of Glasgow, School of Physics & Astronomy)

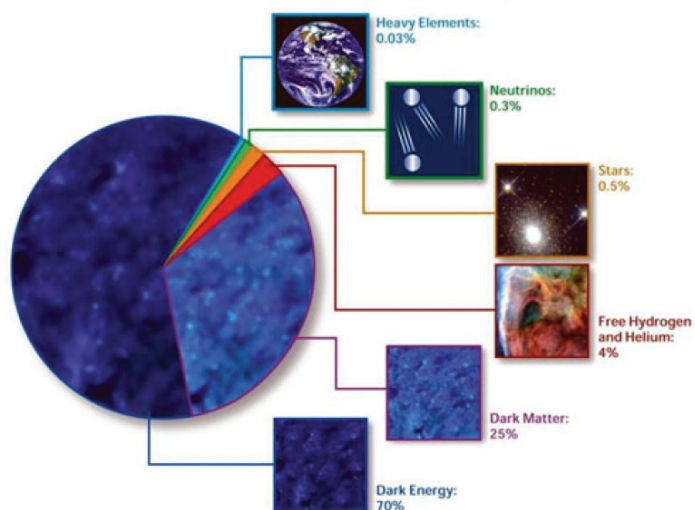
At Brookhaven, the Cosmology and Astrophysics Group is working to solve those mysteries, and more – how to measure and constrain properties of dark matter, dark energy, and the standard cosmological model.

One of the tools they'll be using is the Large Synoptic Survey Telescope (LSST), which is designed to explore the 96 percent of the Universe that remains a mystery. Scheduled for construction on a mountain top north of Santiago, Chile, the LSST will provide time-lapse digital imaging across the entire available night sky every three days. During the ten



Rendering of the Large Synoptic Survey Telescope

COMPOSITION OF THE COSMOS



years of operation, the stunning images will be stitched together to create a motion picture detailing cosmic events in the far reaches of space. Expected to come online in 2016, the LSST will survey a volume of the Universe larger than all previous telescopes combined.

Brookhaven has the lead role in developing the "film" for the telescope's camera which is composed of electronic sensors. The camera will capture images with a resolution of 3.2 gigapixels, offering unprecedented detail and density. In addition to developing instrumentation for the LSST, Lab scientists are preparing to analyze data that LSST will produce to determine the properties of the mysterious dark energy and to test Einstein's theory of gravity over enormous distances.

The gigantic camera will capture images of over five billion distant galaxies. The images will contain the imprint of invisible dark matter whose gravitational pull subtly bends the light emitted by these galaxies as it makes its way from the farthest reaches of the Universe to the telescope. This will allow scientists to, for the first time, construct a large-scale, three dimensional map of the dark matter in the Universe. To learn more, view the latest animation <http://www.lsst.org/lsst/content/animation-collage-april-2011> and visit www.lsst.org.

Legislators Visit BNL



Suffolk County Legislator Visit

In addition to running world-class research programs, hosting big science machines, and engaging students in educational endeavors, Brookhaven Lab also offers cultural programs and opportunities to the community to visit our facilities. More than 40,000 students and teachers visited the Lab last year through the Office of Educational Programs, and several thousand more visitors attended “Summer Sundays” or participated in a group tour, both programs organized by the Community Relations Office.

“Summer Sundays” take place on several Sundays during July and August

with science programs and events for the entire family. Our 2012 open houses will take place each Sunday from July 15 through August 5.

Additionally, group tours of the Lab’s science facilities are often arranged through the Community Relations Office for groups of 10 or more. Most recently, Suffolk County Legislators were invited to visit BNL to learn more about our economic impact on Long Island, our latest energy research, and our educational initiatives. The local representatives heard presentations on the BNL/Stony Brook University Smarter Grid Research, Innovation, Development, Demonstration, Deployment

Center and the Long Island STEM Hub. The Center will bring information, communication, and technologies together to address energy challenges; the STEM Hub is a new program promoting science, technology, engineering and mathematics education to help build Long Island’s workforce. After the presentations, the Legislators toured the Long Island Solar Farm, the first utility-scale PV system in the northeast.

To learn more about the programs available for the community check out the listings under **Happenings**, or visit www.bnl.gov/community.

Happenings

- **March 7** – Noon recital, the Linden String Quartet will perform Bartok’s Quartet No.3 and pianist Michael Brown will perform short solo works by Ravel. They will combine in a performance of the popular Piano Quintet Op. 44 of Robert Schumann, Berkner Auditorium
- **March 8** – Community Advisory Council meeting, 6:30 p.m., Berkner Hall, Room B
- **March 15** – Brookhaven Women in Science Colloquia Series (Visit <http://www.bnl.gov/bwis> to learn more), 4 p.m., Berkner Auditorium

*The events above are free and open to the public. Visitors 16 and over must bring a photo ID for access to BNL events.



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LabLink is a monthly publication from Brookhaven National Lab’s Community Relations Office that will keep you informed about happenings at the Laboratory, help you understand some of the science behind our research, and invite you to our many educational and cultural events. To learn more about the Lab visit www.bnl.gov.

